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**The Effect of Marginal Tax Rates on Capital Gains Revenue:
Another Look at the Evidence**

by

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Summary

Recently, a substantial amount of attention has been given to whether a cut in the capital gains tax rate would, in the long run, increase or decrease tax revenue. Empirical analysis of this issue has been split between two approaches. The first estimates the aggregate responsiveness of realizations directly, using aggregate time-series data, while the second uses micro-data to focus on individual taxpayer responsiveness. The results of these two approaches are often seen as inconsistent, and much of the revenue debate has focused on the relative merits of the two approaches. Unfortunately, despite all this attention, the debate is far from decided.

In this paper we take one more look at the evidence, focusing on three aspects of the controversy. First, we present consistent definitions of the responsiveness of revenue to tax rates, both at the individual and aggregate level. These definitions provide a framework for evaluating empirical evidence on the responsiveness of capital gains realizations to marginal tax rates and demonstrate that simple rules of thumb that have been prevalent in policy discussions are inadequate for estimating revenue. Second, using an often-cited analysis by the Congressional Budget Office as a starting point, we describe and implement a more appropriate econometric procedure for analyzing the data. Third, we present new time-series evidence that incorporates the most recent revisions in the National Accounts and Flow of Funds data, includes a measure of the stock of available gains, and, perhaps most importantly, adds data from 1986 to 1989 to demonstrate the effect of the Tax Reform Act of 1986 on the estimated relationship.

Our aim is to provide the reader with a better understanding of the complex relationship among capital gains tax realizations, revenues and tax rates. Existing analyses do not provide conclusive evidence on the revenue effects of changes in the taxation of capital gains, especially given the limitations on observed data and the difficulty in selecting an appropriate theoretical model for realizations. More work is certainly needed. The weight of the evidence – from both time-series and micro-data studies – does not suggest, however, that a reduction in the capital gains rate from existing levels would decrease tax revenue.

The Effect of Marginal Tax Rates on Capital Gains Revenue: Another Look at the Evidence

I. Introduction

Recently, a substantial amount of attention has been given to whether a cut in the capital gains tax rate would, in the long run, increase or decrease tax revenue (*cf.*, Gideon, 1990; Gravelle, 1987 and 1990; Joint Committee on Taxation, 1990; and Minarik, 1988). Empirical analysis of this issue has been split between two approaches. The first estimates the aggregate responsiveness of realizations directly, using aggregate time-series data (*cf.*, U. S. Department of the Treasury, 1985 and 1988; Congressional Budget Office (CBO), 1988; Auerbach, 1988; and Jones, 1989), while the second uses micro-data to focus on individual taxpayer responsiveness (*cf.*, U. S. Department of the Treasury, 1985; Auten, Burman and Randolph, 1989 and Gillingham, Greenlees and Zieschang, 1990). The results of these two approaches are often seen as inconsistent, and much of the revenue debate has focused on the relative merits of the two approaches. Unfortunately, despite all this attention, the debate is far from decided. In this paper we will take one more look at the evidence, focusing on three aspects of the controversy. First, we will present consistent definitions of the responsiveness of revenue to tax rates, both at the individual and aggregate level. Second, as past practitioners of aggregate analysis of capital gains realizations, we will describe and implement a more appropriate econometric procedure for analyzing the data. Third, we will present new time-series evidence that incorporates the most recent revisions in the National Accounts and Flow of Funds data, includes a measure of the stock of available gains, and, perhaps most importantly, adds data from 1986 to 1989 to demonstrate the effect of the Tax Reform Act of 1986 on the estimated relationship.

II. The Revenue Response

Empirical analyses of capital gains have focused on the responsiveness of *realizations* to tax rates. In asking whether a tax cut will pay for itself, however, one is addressing the response of *revenue* to the tax rate. In this section we address revenue explicitly, building a model of total revenue from a simple analysis of individual taxpayer behavior. We then show how the results of both aggregate time-series and individual taxpayer models of realizations fit into this model. The results demonstrate clearly that evaluating revenue effects of capital gains tax rates requires more than a simple model of either individual or aggregate realizations.

Clearly, the realization of capital gains is an inherently microeconomic phenomenon. Aggregate changes are simply the sum of individual changes in realizations. What is often

ignored is that revenue is also determined at the micro level. To demonstrate the importance of this observation, we begin with a simple, stylized model of individual realizations behavior. First, let

τ_i = the marginal effective tax rate on capital gains faced by the i th taxpayer,

and

G_i = capital gains realized by the i th taxpayer.

Second, assume for simplicity that G is determined only by τ ,¹ so that

$$G_i = G_i(\tau_i).$$

The capital gains revenue from the i th taxpayer is the product of the average tax rate on declared gains, α_i , and the level of realizations, G_i . The revenue effect of a tax policy change depends on how the change separately affects these two factors. The greater the relative effect on marginal rates (and thereby on G_i) and the lesser the effect on inframarginal rates (and α_i), the more likely that a "tax reduction" could enhance revenue. The broad array of potential forms a real-world tax change could take (exclusion percentages, rate caps, indexation) requires that we introduce another variable, ξ , which is the tax schedule parameter on which tax policy is focused.² Then we write the average inframarginal rate as a function of the tax schedule parameter and the level of gains:

$$\alpha_i = \alpha_i(\xi, G_i).$$

Under these assumptions, the capital gains tax revenue obtained from the i th taxpayer is

$$R_i = \alpha_i(\xi, G_i) \cdot G_i(\tau_i),$$

¹The assumption that the marginal effective rate is the relevant tax variable at the micro level is standard in econometric studies, although Gillingham, Greenlees and Zieschang (1989) also employ a "rate structure premium" to reflect the income effect of inframarginal rates. Analysts have typically used other variables as proxies for τ , recognizing that τ is endogenous as a result of its dependence on the level of realizations.

²We represent the tax schedule with one parameter for simplicity only. The capital gains exclusion rate is an example of a single parameter that is a direct policy instrument. Many tax law changes involve changes in a number of parameters. In this more general case, we would redefine ξ as a vector, and generalize the elasticities accordingly. Similarly, the average tax rate, α , is a function of ξ and G conditional on many other variables. For ease of exposition, we suppress these other variables.

and the elasticity of revenue with respect to the policy parameter is

$$\eta_{\xi}^{R_i} = \eta_{\xi|G_i}^{\alpha_i} + \eta_{G_i|\tau_i}^{\alpha_i} \cdot \eta_{\tau_i}^{G_i} \cdot \eta_{\xi}^{\tau_i} + \eta_{\tau_i}^{G_i} \cdot \eta_{\xi}^{\tau_i} , \quad (1)$$

where $\eta_{y|z}^x$ is the elasticity of x with respect to y , conditional on z .

The first term measures the impact of the change in the marginal rate on the average rate, holding realizations constant. In the terms used by revenue estimators, it measures the "static" revenue effect. The second and third terms of equation (1) both include $\eta_{\tau_i}^{G_i}$, the elasticity of realizations with respect to the marginal tax rate, and $\eta_{\xi}^{\tau_i}$, the elasticity of the marginal tax rate with respect to the tax schedule parameter. The second term measures the impact on the average tax rate of the induced change in realizations. This is the "bracket creep" effect, although it does not require taxpayers to move into a different tax bracket. The last term measures the change in revenue resulting from the induced behavioral response, holding the average tax rate constant. Combining the last two terms in equation (1) and recognizing that $\eta_{G_i|\tau_i}^{\alpha_i} = (\tau_i - \alpha_i)/\alpha_i$, equation (1) can be rewritten as

$$\eta_{\xi}^{R_i} = \eta_{\xi|G_i}^{\alpha_i} + \frac{\tau_i}{\alpha_i} \cdot \eta_{\tau_i}^{G_i} \cdot \eta_{\xi}^{\tau_i} . \quad (2)$$

Revenue will vary inversely with the tax schedule parameter if $\eta_{\xi}^{R_i}$ is negative. Under a strictly proportional tax system, the only tax schedule parameter of interest is the marginal tax rate. Letting $\tau = \xi = \tau_i = \alpha_i$, the revenue elasticity simplifies to

$$\eta_{\tau}^{R_i} = 1 + \eta_{\tau}^{G_i} \quad (3)$$

and revenue will vary inversely with the tax rate if and only if the realizations elasticity is less than minus one. This relationship, which obtains even at the individual taxpayer level *only* when the marginal and average tax rates on capital gains are equal, has given rise to the oft-repeated, but incorrect, rule of thumb that the realizations response must be elastic (or at least *roughly* elastic) for a tax-rate cut to increase revenue (Gravelle 1987, p. 421 and 1990, p. 214 and Joint Committee on Taxation 1990, p. 41). When the tax system is not proportional, the other terms in equation (2) play an important role in determining the revenue effect of a change in the marginal tax rate. As we will demonstrate below, the relevance of the realizations-elasticity rule of thumb becomes even more tenuous when the focus is total revenue.

The aggregate revenue elasticity is derived by noting fact that total revenue, R , is the sum of individual revenues, R_i . Taking the elasticity of R with respect to ξ yields

$$\eta_{\xi}^R = \sum_i \frac{R_i}{R} (\eta_{\xi}^{R_i}) = \sum_i \frac{R_i}{R} (\eta_{\xi G_i}^{\alpha_i}) + \sum_i \frac{R_i}{R} \left(\frac{\tau_i}{\alpha_i} \cdot \eta_{\tau_i}^{G_i} \cdot \eta_{\xi}^{\tau_i} \right). \quad (4)$$

Once we focus on total revenue, evaluating the revenue implications of a change in tax policy becomes more complex. By equation (2), the sensitivity of *individual* revenue to the policy parameter ξ depends on, *inter alia*, the elasticity of gains with respect to the marginal tax rate, the ratio of marginal and average tax rates, and the sensitivity of the marginal and average rates to ξ . Equation (4) shows that the responsiveness of *total* revenue depends on the *distributions* of all these factors, as well as on the distribution of revenue across taxpayers. Simply evaluating the average of $\eta_{\tau_i}^{G_i}$, or even knowing how this elasticity varies across taxpayers, is *not* sufficient to answer any questions about revenue.

Given the form of equation (4), microeconomic parameter estimation and revenue simulation is the clearly preferred method for evaluating the revenue impact of a change in capital gains tax rate policy. With a micro simulation, revenue can be calculated *at the individual taxpayer level* and simply summed up to obtain a total revenue effect. This procedure was used in Treasury (1985) to simulate the effect of the 1978 increase in the capital gains exclusion (Section 555 of the Revenue Act of 1978). Assuming for the sake of example that ξ is the weighted-average marginal tax rate on capital gains reported in Table 4.5 of Treasury (1985) and treating each of the AGI classes in that table as a single taxpayer, η_{ξ}^R , computed as an arc elasticity, is equal to -0.6.^{3,4} The elasticity of total realizations with respect to the AGI category marginal tax rates is, however, only -1.3 (see Treasury, 1985). Using the simple rule of thumb defined above (*cf.* equation (3)), the revenue elasticity should have been -0.3.

This example demonstrates the potential quantitative importance of the point made theoretically in equation (4), that the elasticity of total gains with respect to the tax rate need not exceed unity for revenue to vary inversely with the tax rate. One should not

³We make these assumptions to simplify exposition. The weighted-average marginal tax rate is not really a control variable. The Revenue Act of 1978 changed a number of specific rules such as the exclusion percentage, the treatment of the exclusion as a tax preference, and the "poisoning" of the maximum tax on personal service income by the exclusion. The estimated realizations model was used in Treasury (1985) to estimate what would happen to the average marginal rate.

⁴Because tax law changes incorporate *discrete*, rather than *marginal*, changes in tax schedule parameters, *arc* elasticities must be used to evaluate responsiveness. An arc elasticity is the ratio of average percentage changes over a discrete interval, rather than the ratio of infinitesimal percentage changes at a point.

generalize from this example, however. The quantitative difference between the realizations and revenue elasticity depends on both taxpayer behavior and the structure of the tax system; the latter, at least, changes substantially over time. The current rate structure has a more gradual slope and, therefore, the difference between marginal and average tax rates is likely to have less of an effect on the relationship between revenue and realization elasticities than it has had in the past.

While micro-simulation is an inherently complex exercise, evaluating the revenue effect of a change in the capital gains tax rate is much more problematic with an aggregate, time-series model of realizations. These models do not yield direct estimates of aggregate revenue. More significantly, they cannot, in general, be derived from a theoretically consistent model of individual taxpayer behavior. Therefore, even if we accept their ability to explain aggregate realizations, they cannot be used to obtain a set of individual-level realization elasticities for use in a micro-simulation of revenue. We can, however, use the above framework to show how an aggregate revenue elasticity would differ from an aggregate realizations elasticity estimated with time-series data. Since time-series regressions use an aggregate tax-rate indicator, rather than the marginal tax rate, as an independent variable, we can reinterpret ξ as this aggregate variable. Recognizing that the elasticity of aggregate realizations with respect to ξ is

$$\eta_{\xi}^G = \sum_i \frac{G_i}{G} \left(\eta_{\tau_i}^{G_i} \cdot \eta_{\xi}^{\tau_i} \right),$$

equation (4) can be rewritten as

$$\eta_{\xi}^R = \sum_i \frac{R_i}{R} \left(\eta_{\xi G_i}^{R_i} \right) + \eta_{\xi}^G + \sum_i \frac{G_i}{G} \left(\left(\frac{\tau_i}{\alpha} - 1 \right) \cdot \eta_{\tau_i}^{G_i} \cdot \eta_{\xi}^{\tau_i} \right), \quad (5)$$

where α is the average tax rate for all taxpayers. Even if the time-series equation can accurately estimate η_{ξ}^G , the aggregate revenue elasticity cannot be easily measured. Evaluating the first and third terms of equation (5) requires detailed information on how average and marginal tax rates covary at the individual taxpayer level. Under a progressive tax system, however, we can expect that the first term will be around unity and that the third term will be negative. Consequently, the aggregate revenue elasticity can be negative even if η_{ξ}^G is less than one in absolute value.

We believe that the preceding discussion of elasticities is necessary to establish a consistent framework for interpreting empirical evidence on capital gains realizations and revenues. Simple rules of thumb are insufficient for evaluating the revenue impact of

capital gains tax rates, even if we assume that aggregate realizations elasticities are known. This latter assumption, however, is itself problematic. With that in mind, in the next sections we will focus on time-series estimates of the *realizations* elasticity.

III. Time-Series Analyses of the Realizations Response

The use of aggregate time-series data to analyze capital gains realizations is subject to problems of small sample size and possible aggregation bias. It also fails to avoid the endogeneity problems encountered in specifying and estimating a micro-data model. Despite the fact that the CBO (1988) study went to great lengths to avoid endogeneity, a simple correction to the CBO study shows just how important careful treatment of endogeneity is. Although CBO constructed a presumably exogenous marginal tax rate variable – the marginal rate evaluated at a predicted, rather than actual, level of gains – it used this variable directly in an ordinary least squares (OLS) regression. This is insufficient to obtain unbiased coefficient estimates, since the exogenous variable is an imperfect measure of the actual marginal tax rate, which, although endogenous, is the true, underlying explanatory variable. The appropriate econometric solution for this problem is to use the exogenous measure as an instrument for the actual marginal rate in an instrumental variable (IV) regression.⁵

Table 1 presents both OLS and IV coefficient estimates obtained for CBO's preferred regression, based on the 1954 to 1985 sample. We constructed the actual marginal tax rate by substituting actual realizations for predicted realizations in the worksheets used by CBO to construct their exogenous measure. For comparison purposes we also used the maximum statutory rate as an alternative instrument.⁶ Since the actual marginal tax rate and CBO instrument are constructed in a very similar fashion from the same data base, they may share estimation errors. The maximum tax rate should be a better instrument because it is completely exogenous and measured without error. Using either instrument, the IV procedure yields a substantially larger (in absolute value) tax rate coefficient. In fact, the estimated elasticity for this specification, evaluated at an average marginal tax rate of 25 percent, is -1.04 using the CBO instrument and -1.44 using the "maximum" tax

⁵See Johnston (1980, pp. 278-281) for a brief description of instrumental variables estimators. This technique is an analogous, although not operationally identical, to the techniques employed with micro-data to correct for endogeneity at the individual level.

⁶This measure is similar to the tax rate variable developed in Treasury (1985) for its time-series analysis. It differs, however, in being a completely exogenous statutory measure rather than the average rate paid by high income taxpayers. For recent years, in which the highest rate did not apply to the highest income taxpayers, we used the rate in the open-ended segment of the schedule. This rate is also, by construction of the rate schedule, the maximum average rate analogous to the 25 percent alternative rate available in the 1950's and 1960's.

rate instrument, compared to -0.73 using OLS.⁷ Incomplete treatment of endogeneity in the time-series analysis would thus appear to bias the estimate of responsiveness toward zero by a substantial amount.

Table 1: Parameter Estimates for the CBO Capital Gains Realizations Model
(*t*-statistics in parentheses)

Variable	Estimation Method				
	OLS	Instrumental Variable		Differenced IV	
		(CBO)	(Maximum)	(CBO)	(Maximum)
Constant	-9.672 (-6.352)	-9.604 (-5.841)	-10.371 (-5.432)	N.A.	N.A.
Log of Real GDP	0.929 (2.781)	0.911 (2.539)	1.115 (2.565)	2.224 (2.216)	2.375 (2.113)
Change in Log of Real GDP	2.433 (2.778)	2.460 (2.574)	2.397 (2.385)	1.929 (2.000)	2.055 (1.918)
Log of GDP Deflator	0.756 (5.266)	0.715 (4.259)	0.636 (3.254)	-0.217 (-0.316)	-0.383 (-0.474)
Log of Corporate Equities	0.521 (4.194)	0.588 (4.991)	0.544 (4.129)	0.768 (4.923)	0.808 (4.364)
Marginal Tax Rate	-0.029 (-2.270)	-0.042 (-2.078)	-0.058 (-2.131)	-0.063 (-1.797)	-0.089 (-1.429)
Standard Error of Estimate	0.11	0.12	0.12	0.14	0.15
Durbin-Watson Statistic	1.45	1.50	1.51	2.26	2.21
<i>Tax Rate Elasticity</i>					
at 20% Tax Rate	-0.59	-0.84	-1.15	-1.26	-1.78
at 25% Tax Rate	-0.73	-1.04	-1.44	-1.57	-2.23
at 30% Tax Rate	-0.88	-1.25	-1.73	-1.89	-2.67

Auerbach (1988) and Jones (1989) suggest that the time-series models should be run in differenced form.⁸ Table 1 demonstrates that this also affects the estimated responsiveness

⁷The average marginal tax rate before passage of the Omnibus Budget Reconciliation Act of 1990 was approximately 25.7 percent (*cf.* Gideon, 1990). The OLS regression coefficients and elasticity estimate differ slightly from those reported by CBO because we include short-term gains in the dependent variable, and due to subsequent data revisions and the substitution of GDP for GNP. We also do not deflate the value of corporate equities, but this simply reduces the coefficient on the deflator by unity and has no effect on the coefficient of the corporate equities variable. All data used in this paper are displayed in the Appendix Table.

⁸Auerbach and Jones also include a constant term in their differenced regressions. We do not present results with a constant term, for three reasons: (1) the constant term is inconsistent with the level specification (since the latter includes no time trend variable) and we wanted to focus on the effects of changes in estimation method, (2) its estimated coefficient is insignificantly different from zero, and (3) the results with a constant term are essentially identical to those obtained without a constant term. For instance, adding a constant term to the first of the differenced specifications in Table 1 changes the coefficient on the marginal tax rate from -0.063 to -0.060, and the coefficient on the constant has a *t*-statistic of -0.093.

of realizations. The differenced, instrumental-variable coefficient is 56 per cent larger than the comparable level-equation estimate. Evaluated at a 25 percent tax rate, the elasticities for this specification are -1.57 and -2.23 using the two instruments. We do not want to argue that differencing the time-series is econometrically *required* in the same sense that instrumental variable estimation is. Rather, we include these estimates because differencing is one way to improve the properties of the error structure and to further demonstrate that econometric issues which one might consider to be relatively insignificant in time-series analyses are, in fact, important.

The data used in the CBO *Report* extend only to 1985. It is now possible to see how the equations presented above hold up when the sample is extended beyond the Tax Reform Act of 1986. Table 2 presents parameter estimates obtained for the differenced model when the sample is extended through 1989.⁹ The first two columns of Table 2 replicate specifications in the last two columns of Table 1. Simply extending the sample yields an increase in the estimated elasticity of realizations with respect to the marginal tax rate when the CBO tax rate is used as the instrument, but no change when the maximum tax rate is the instrument. Because the surge in expectations in 1986 was to a large extent in anticipation of the (known) rate increase in 1987, we added a dummy variable, equal to unity in 1986, before differencing the data. These regressions are presented in the last two columns of Table 2, and demonstrate that special treatment of 1986 substantially lowers the estimated realizations elasticity. In all cases, however, the estimated elasticity is greater than that obtained with the original CBO model.

In addition to the extending the sample, we also experimented with substituting a measure of the stock of capital gains for the stock of corporate equities. This variable was modeled on the series developed by David Joulfaian (1989), although the numbers do not exactly match his because of revisions in the source data and because we set the stock of accrued gains at the beginning of 1948 to one-half of the asset value at that point. We define "available" gains in period t as the stock of accrued gains at the beginning of the period, plus accruals during the period, minus an estimate of the step-up of basis at death during the period. Since the accrual measures are only approximate, we also use the corporate equities variable as an instrument for available gains in estimating the equations. The results, displayed in Table 3, are of interest for several reasons. First, the

⁹Adding additional years to the analysis required the estimation of "predicted" levels of capital gains by income stratum for 1986 through 1989 analogous to those estimated by CBO for 1954 to 1985. We formulated a prediction model for these years similar in spirit, but less complex, than that used by CBO for the earlier years.

estimated coefficient on the marginal tax rate is essentially unchanged, indicating that the lack of a measure of accrued gains in previous equations may not have had a great impact on estimates of responsiveness. Second, the available gains variable performs very well; in all cases it is the most significant variable in the equation. Finally, even though an instrument is used for the gains variable, with associated loss of precision, the standard error of the equation is lower when the gains variable is substituted for the corporate equities variable.

**Table 2: Parameter Estimates for Differenced Model
with Extended Sample
(t-statistics in parentheses)**

Variable	Without 1986 Dummy Variable		With 1986 Dummy Variable	
	(CBO)	(Maximum)	(CBO)	(Maximum)
Log of Real GDP	2.521 (1.978)	2.836 (2.116)	1.991 (2.073)	2.275 (2.127)
Change in Log of Real GDP	1.891 (1.547)	1.941 (1.533)	1.993 (2.190)	2.008 (2.063)
Log of GDP Deflator	-0.384 (-0.450)	-0.503 (-0.567)	-0.046 (-0.072)	-0.176 (-0.251)
Log of Corporate Equities	0.804 (4.284)	0.816 (4.195)	0.686 (4.817)	0.712 (4.602)
Marginal Tax Rate	-0.067 (-3.709)	-0.089 (-3.544)	-0.034 (-2.086)	-0.054 (-1.993)
Dummy Variable for 1986			0.529 (4.423)	0.444 (2.853)
Standard Error of Estimate	0.18	0.19	0.13	0.14
Durbin-Watson Statistic	2.34	2.04	2.21	2.10
<i>Tax Rate Elasticity</i>				
at 20% Tax Rate	-1.34	-1.78	-0.69	-1.07
at 25% Tax Rate	-1.67	-2.23	-0.86	-1.34
at 30% Tax Rate	-2.00	-2.67	-1.03	-1.61

To summarize, both the necessary use of instrumental variables and the reasonable use of differencing suggest, at a minimum, that time-series models are sensitive to simple changes in specification.¹⁰ The elasticity estimates in Tables 1 through 3 certainly cannot

¹⁰Although we have not analyzed the potential aggregation bias, it is worth noting that the effect of misspecifying the aggregate relationship is still an open question. The importance of this problem was minimized by CBO, based on a test in which the equation was run separately for the bottom 99 percent and the top one percent of taxpayers, ranked by AGI. Unfortunately, however, this is not a test of aggregation bias, since no micro specification will aggregate into CBO's logarithmic form, and the two subsets on which

be taken as definitive. In addition, as discussed in Section II, determining the revenue implications of time-series coefficients is a very problematic exercise. The realizations equations presented in this section are not sufficient to determine the revenue effect of a change in the marginal tax rate. We continue to argue for the superiority of the microeconomic approach. Nevertheless, it is at least suggestive that the adjustments made here yield more elastic time-series estimates of behavioral response, more similar to those obtained from micro-data analyses.

**Table 3: Parameter Estimates for Differenced Model
with Extended Sample and Stock of Gains Variable**
(*t*-statistics in parentheses)

Variable	Without 1986 Dummy Variable		With 1986 Dummy Variable	
	(CBO)	(Maximum)	(CBO)	(Maximum)
Log of Real GDP	2.285 (1.961)	2.582 (2.111)	1.792 (2.206)	2.048 (2.249)
Change in Log of Real GDP	1.856 (1.660)	1.903 (1.646)	1.963 (2.547)	1.976 (2.376)
Log of GDP Deflator	-2.279 (-2.394)	-2.418 (-2.447)	-1.665 (-2.488)	-1.842 (-2.488)
Log of Available Gains	1.681 (4.689)	1.704 (4.597)	1.435 (5.694)	1.486 (5.391)
Marginal Tax Rate	-0.068 (-4.126)	-0.089 (-3.889)	-0.035 (-2.539)	-0.053 (-2.325)
Dummy Variable for 1986			0.527 (5.208)	0.448 (3.378)
Standard Error of Estimate	0.16	0.17	0.11	0.12
Durbin-Watson Statistic	2.19	1.81	2.08	1.88
<i>Tax Rate Elasticity</i>				
at 20% Tax Rate	-1.36	-1.78	-0.71	-1.07
at 25% Tax Rate	-1.70	-2.23	-0.89	-1.34
at 30% Tax Rate	-2.04	-2.68	-1.06	-1.60

IV. Conclusion

We hope that any reader who has persevered through the preceding discussion will have a better understanding of the complex relationship among capital gains tax realizations, revenues and tax rates. Existing analyses do not provide conclusive evidence on the revenue effects of changes in the taxation of capital gains, especially given the

CBO ran its tests cannot be aggregated to obtain their total sample specification. The problem of aggregation bias is also examined in CBO (1989), but from the perspective of simulation rather than estimation.

limitations on observed data and the difficulty in selecting an appropriate theoretical model for realizations. More work is certainly needed. The weight of the evidence – from both time-series and micro-data studies – does not suggest, however, that a reduction in the capital gains rate from existing levels would decrease tax revenue.

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Appendix Table

Year	Capital Gains		Components of Available Gains			
	Realizations	Maximum Tax Rate	Accrued Gains	Annual Accruals	Basis Step-up	Available Gains
1954	7.2	25.0	331.2	86.8	3.0	415.1
1955	9.9	25.0	405.8	73.7	3.3	476.2
1956	9.7	25.0	463.3	45.9	3.6	505.6
1957	8.1	25.0	493.1	-22.3	3.5	467.3
1958	9.4	25.0	458.5	124.3	4.1	578.8
1959	13.1	25.0	566.9	44.4	4.3	607.0
1960	11.7	25.0	589.9	6.2	4.4	591.6
1961	16.0	25.0	577.2	126.1	4.9	698.4
1962	13.5	25.0	677.9	-42.9	4.8	630.2
1963	14.6	25.0	614.9	97.7	5.2	707.4
1964	17.4	25.0	689.6	76.2	5.6	760.2
1965	21.5	25.0	738.7	101.7	6.0	834.3
1966	21.3	25.0	806.5	-6.7	6.1	793.7
1967	27.5	25.0	766.2	194.2	6.9	953.5
1968	35.6	26.9	914.4	247.1	7.8	1,153.7
1969	31.4	27.5	1,106.1	-29.8	7.7	1,068.5
1970	20.8	30.2	1,030.6	30.1	7.9	1,061.8
1971	28.3	32.5	1,040.4	214.2	8.8	1,245.8
1972	35.9	35.0	1,209.0	288.9	9.9	1,488.1
1973	35.8	35.0	1,442.1	36.0	9.5	1,468.6
1974	30.2	35.0	1,427.0	39.8	11.0	1,455.8
1975	30.9	35.0	1,422.4	-418.1	11.7	1,828.7
1976	39.5	35.0	1,789.4	447.2	13.5	2,223.1
1977	45.3	35.0	2,155.3	365.7	19.2	2,501.8
1978	50.5	35.0	2,435.8	550.7	22.2	2,964.3
1979	73.4	28.0	2,892.0	833.4	26.1	3,699.3
1980	74.6	28.0	3,597.8	956.2	30.3	4,523.6
1981	80.9	20.0	4,425.3	388.5	32.6	4,781.2
1982	90.2	20.0	4,681.7	391.9	33.4	5,040.2
1983	122.8	20.0	4,924.4	432.5	36.1	5,320.8
1984	139.8	20.0	5,163.8	392.5	37.3	5,519.1
1985	170.6	20.0	5,345.6	782.0	40.5	6,087.1
1986	324.4	20.0	5,869.2	607.1	44.2	6,432.1
1987	144.2	28.0	6,020.9	361.5	46.5	6,336.0
1988	172.0	28.0	6,154.8	546.7	50.8	6,650.7
1989	151.8	28.0	6,434.6	967.2	55.1	7,346.7

Notes: All dollar amounts measured in billions.

Sources: Realizations are from *Statistics of Income*, various issues.

Maximum tax rate is from Treasury (1985, Table 1.13, line 1) and recent tax schedules.

Available gains constructed from data and methods in Joulfaian (1989) and data from Board of Governors (1992).

Appendix Table (cont'd)

Year	Constructed Tax Rates		Real GDP	GDP Deflator	Corporate Equities
	Predicted Gains	Actual Gains			
1954	17.3	16.5	1,678.9	22.1	224.9
1955	17.7	17.3	1,772.2	22.9	273.9
1956	18.0	17.4	1,808.6	23.7	291.9
1957	17.2	16.4	1,838.8	24.5	255.8
1958	17.3	16.4	1,824.7	25.0	357.2
1959	17.1	16.8	1,931.3	25.6	384.7
1960	16.7	16.5	1,973.2	26.0	378.4
1961	17.1	17.6	2,025.6	26.3	477.9
1962	16.8	16.8	2,129.8	26.8	416.2
1963	16.9	16.7	2,218.0	27.2	488.7
1964	16.2	16.5	2,343.3	27.7	535.7
1965	16.1	16.4	2,473.5	28.4	600.5
1966	16.2	15.8	2,622.3	29.4	540.9
1967	16.7	16.7	2,690.3	30.3	676.3
1968	18.6	18.9	2,801.0	31.7	806.9
1969	18.8	19.6	2,877.1	33.3	699.1
1970	19.5	18.8	2,875.8	35.1	682.7
1971	19.9	19.4	2,959.3	37.1	778.0
1972	20.1	20.1	3,107.1	38.8	862.0
1973	19.5	19.2	3,268.6	41.3	663.6
1974	19.5	18.4	3,248.1	44.9	459.9
1975	20.1	18.0	3,221.7	49.2	598.6
1976	21.9	19.4	3,380.8	52.3	712.9
1977	22.2	20.4	3,533.3	55.9	668.5
1978	22.7	20.6	3,703.5	60.3	663.9
1979	18.1	17.7	3,796.8	65.5	812.2
1980	18.6	18.0	3,776.3	71.7	1,111.3
1981	16.8	17.3	3,843.1	78.9	1,051.2
1982	14.8	15.9	3,760.3	83.8	1,184.0
1983	14.4	15.2	3,906.6	87.2	1,334.5
1984	14.0	15.1	4,148.5	91.0	1,343.6
1985	13.9	15.4	4,279.8	94.4	1,700.0
1986	16.4	16.3	4,404.5	96.9	1,877.1
1987	26.2	25.7	4,540.0	100.0	1,750.9
1988	27.0	27.1	4,718.6	103.9	1,876.6
1989	25.8	26.7	4,836.9	108.4	2,205.1

Note: All dollar amounts measured in billions.

Sources: Predicted gains rate for 1954 to 1985 from CBO (1988). Actual gains rate constructed from worksheets supplied by Larry Ozanne. Rates for 1986 to 1989 are from authors' calculations.

GDP and GDP Deflator are official data for 1959 to 1989; movements prior to 1959 based on unrevised GNP series.

Corporate equities are from Board of Governors (1992).